AMENDMENTS TO THE CLAIMS

1. (Currently Amended) For use with a mode-locked laser source propagating pulsed laser energy characterized by a repetition rate, an optical sensor apparatus for measuring a measurable parameter, the optical sensor apparatus comprising:

an optical resonator disposed to receive at least a portion of the pulsed laser energy, the optical resonator having a waveguide comprising a first dielectric, a cavity defining a variable gap comprising a second dielectric different than the first dielectric, and a sensing surface positioned to vary the variable gap ~~responsive to changes in the measurable parameter at the sensing surface and the optical resonator defining a cavity forming a variable gap that varies~~ in response to changes in the measurable parameter at the sensing surface ~~and that is positioned~~ such that the repetition rate of the pulsed laser energy changes in response to changes in the measurable parameter.

2. (Currently Amended) The optical sensor apparatus of claim 1, ~~wherein the optical resonator further comprises a waveguide for propagating the at least a portion of the laser energy~~ wherein the sensing surface is an outer surface of the waveguide.

3. (Currently Amended) The optical sensor apparatus of claim ~~2~~ 1, wherein the waveguide further comprises a core and a cladding surrounding the core such that the at least a portion of the laser energy propagates within the core under total internal reflection.

4. (Original) The optical sensor apparatus of claim 3, wherein the cavity is disposed at least partially within the core.

5. (Original) The optical sensor apparatus of claim 3, wherein the cavity is disposed entirely within the cladding.

6. (Original) The optical sensor of claim 1, wherein the optical resonator further comprises a first reflector at an entrance end of the optical resonator and a second reflector at an exit end of the optical resonator.

7. (Currently Amended) The optical sensor of claim 1, wherein the ~~optical resonator comprises~~ waveguide is a ring resonator.

8. (Original) The optical sensor of claim 7, wherein the ring resonator is formed of an optical fiber.

9. (Original) The optical sensor of claim 7, wherein the ring resonator is formed in an optical substrate.

10. (Original) The optical sensor of claim 7, wherein the ring resonator is formed of a photonic crystal structure.

11. (Canceled)

12. (Original) The optical sensor of claim 1, wherein the measurable parameter is selected from the group consisting of pressure, temperature, flow rate, material composition, force, and strain.

13. (Currently Amended) The optical sensor of claim 1, wherein the ~~optical resonator comprises~~ waveguide is a microdisc.

14. (Original) The optical sensor of claim 13, wherein the laser source is a distributed feedback laser in the form of a vertical cavity surface emitting laser.

15. (Currently Amended) The optical sensor of claim 1, wherein the ~~optical resonator~~ waveguide is a microsphere having a first hemisphere and a second hemisphere spaced apart by the variable gap, the sensing surface being the outer shell of the microsphere.

16. (Currently Amended) The optical sensor of claim 1, wherein the ~~optical resonator~~ waveguide is a microsphere disposed within a receiving cavity formed in a dielectric module, the dielectric module having a membrane that flexes in response to

changes in the measurable parameter at the sensing surface to change the repetition rate of the laser energy.

17. (Original) The optical sensor of claim 1, further comprising a measuring apparatus for measuring the repetition rate of the laser energy.

18. (Original) The optical sensor of claim 1, wherein the optical resonator is external to the mode-locked laser source.

19. (Original) The optical sensor of claim 1, wherein the optical resonator is internal to the mode-locked laser source, forming a laser cavity of the mode-locked laser source.

20. (Currently Amended) For use with a laser source, an optical sensor apparatus for use in measuring a measurable parameter, the optical sensor apparatus comprising:

an optical resonator having a waveguide comprising a first dielectric, a cavity defining a variable gap comprising a second dielectric different than the first dielectric, and a sensing surface positioned to vary the variable gap in response ~~responsive~~ to changes in the measurable parameter at the sensing surface, the optical resonator defining a resonant frequency that varies in response to variations in the variable gap ~~is dependent upon the measurable parameter at the sensing surface~~, the optical resonator being disposed such that a laser signal from the optical sensor apparatus has a frequency at the resonant frequency~~, the optical resonator further defining a cavity forming a variable gap that varies in response to the sensing surface~~.

21. (Original) The optical sensor apparatus of claim 20, wherein the optical resonator is internal to the laser source and forms a laser cavity of the laser source.

22. (Original) The optical sensor apparatus of claim 20, wherein the optical resonator forms a resonator that is external to the laser source.

23. (Currently Amended) The optical sensor apparatus of claim 20, wherein ~~the optical resonator further comprises a waveguide for propagating at least a portion of the laser signal, the waveguide including the cavity~~ the measurable parameter is a physical parameter that applies a force to the sensing surface for varying the variable gap.

24. (Currently Amended) The optical sensor apparatus of claim 20, wherein the waveguide further comprises a core and a cladding surrounding the core such that the ~~at least a portion of the~~ laser signal propagates within the core under total internal reflection.

25. (Currently Amended) The optical sensor apparatus of claim 20, wherein the ~~optical resonator~~ waveguide further comprises a first reflector at an entrance end of the optical resonator and a second reflector at an exit end of the optical resonator.

26. (Currently Amended) The optical sensor apparatus of claim 20, wherein the ~~optical resonator~~ waveguide comprises a ring resonator.

27. (Currently Amended) The optical sensor apparatus of claim ~~20~~ 23, wherein the ~~measurable~~ physical parameter is selected from the group consisting of pressure, temperature, flow rate, material composition, force, and strain.

28. (Currently Amended) The optical sensor apparatus of claim 20, wherein the laser source is a distributed feedback laser and the ~~optical resonator~~ waveguide is a microdisc.

29. (Currently Amended) The optical sensor apparatus of claim 20, wherein the ~~optical resonator~~ waveguide is a microsphere having a first hemisphere and a second hemisphere spaced apart by a variable gap that changes in response to changes in the measurable parameter at the sensing surface of the optical resonator, the sensing surface being the outer shell of the microsphere.

30. (Currently Amended) The optical sensor apparatus of claim 20, wherein the ~~optical resonator~~ waveguide is a microsphere disposed within a receiving cavity formed in a

dielectric module, the dielectric module having a membrane that flexes in response to changes in the measurable parameter at the sensing surface.

31. (Original) The optical sensor apparatus of claim 20, further comprising a measuring apparatus for measuring the frequency of the laser signal.

32. (Canceled)

33. (Original) The optical sensor apparatus of claim 20, wherein the optical resonator is formed of a lasing material.

34. (Original) The optical sensor apparatus of claim 20, wherein the optical resonator is formed of a non-lasing material.

35. (Currently Amended) An apparatus for modulating, based on a measurable parameter, the output of a laser source producing a laser energy, the apparatus comprising:

a coupler coupled to receive the laser energy;

a sensing surface; and

an external high Q resonator characterized by a resonant frequency that varies in response to changes in the measurable parameter, the high Q resonator coupled to the coupler for modulating the laser energy into an information carrying laser signal having a frequency at the resonant frequency of the high Q resonator, wherein the measurable parameter is a physical parameter creating a change in a force applied to the sensing surface to vary the resonant frequency.

36. (Currently Amended) The apparatus of claim 35, wherein the coupler is a waveguide coupler.

37. (Currently Amended) The apparatus of claim 35, wherein the ~~measurable~~ physical parameter is selected from the group consisting of pressure, temperature, flow rate, material composition, force, and strain.

38. (Original) The apparatus of claim 35, wherein the laser source has a laser cavity characterized by a first Q value, Q1, and the high Q resonator is characterized by a second Q value, Q2, that is substantially higher than Q1.

39. (Original) The apparatus of claim 38, wherein Q2 is at least 100.

40. (Currently Amended) A variable frequency resonator comprising an optical resonator having a sensing surface and having a waveguide having a cavity defining a variable gap, the optical resonator characterized by a resonant frequency that is dependent upon the variable gap which is disposed to alter the resonant frequency of the optical resonator in response to changes in [the] a measurable parameter at the sensing surface.

41. (Currently Amended) The variable frequency resonator of claim [36] 40, wherein the optical resonator further comprises a first reflector disposed at an entrance face of the waveguide and a second reflector disposed at an exit face of the waveguide, the first reflector and second reflector defining a resonant length through the waveguide.

42. (Original) The variable frequency resonator of claim 40, wherein the waveguide is an optical fiber having a core and a cladding.

43. (Original) The variable frequency resonator of claim 40, wherein the waveguide is a ring resonator.

44. (Original) The variable frequency resonator of claim 40, wherein the waveguide is formed in a photonic crystal.

45. (Currently Amended) A method of sensing a measurable parameter, the method comprising ~~the steps of~~:

providing a laser signal;

providing a resonator characterized by a resonant frequency;

providing a waveguide comprising a first dielectric and a cavity defining a variable gap comprising a second dielectric different than the first and that varies in response to

changes in the measurable parameter, where variations to the variable gap alter the resonant frequency;

propagating at least a portion of the laser signal through the resonator such that the laser signal has a frequency at the resonant frequency; and

sensing changes in the measurable parameter~~, such that said sensed changes to the measurable parameter alter~~ based on the frequency of the propagated laser signal.

46. (Currently Amended) The method of claim 45, wherein ~~the resonator is formed of a dielectric material and wherein the step of~~ providing the resonator further comprises ~~the steps of~~:

placing a first reflector at an entrance side of the first dielectric ~~material~~; and

placing a second reflector at an exit side of the first dielectric ~~material~~, where the first reflector is partially transmissive at the frequency of the laser signal.

47. (Original) The method of claim 46, wherein the ~~dielectric material~~ waveguide is an optical fiber having an inlet end and an outlet end and ~~the step of~~ providing the resonator further comprises ~~the steps of~~:

forming a first Bragg reflector at the inlet end; and

forming a second Bragg reflector at the outlet end.

48. (Currently Amended) The method of claim 45, wherein the laser signal is produced by a laser source and the resonator is external to the laser source, ~~the step of~~ propagating the laser signal further comprising coupling the laser signal from the laser source to the resonator.

49. (Original) The method of claim 45, wherein the resonator is formed of a lasing material.

50. (Original) The method of claim 45, wherein ~~the step of~~ sensing changes in the measurable parameter comprises the step of providing a sensing surface communicating with the variable gap.

51. (Currently Amended) A method of sensing a measurable parameter, the method comprising ~~the steps of~~:

providing a pulsed laser signal characterized by a repetition rate;

providing a resonator comprising a waveguide formed of a first dielectric;

providing a cavity defining a variable gap formed of a second dielectric different that the first and that varies in response to changes in the measurable parameter;

propagating at least a portion of the pulsed laser signal through the resonator such that the repetition rate of the pulsed laser signal changes in response to variations in the variable gap; and

sensing changes in the repetition rate ~~variations in the variable gap such that the repetition rate of the pulsed laser signal changes~~ in response to variations in the variable gap.

52. (Original) The method of claim 51, ~~wherein the resonator is formed of a dielectric material and~~ wherein ~~the step of~~ providing the resonator further comprises ~~the steps of~~:

placing a first reflector at an entrance side of the first dielectric ~~material~~; and

placing a second reflector at an exit side of the first dielectric ~~material~~, where the first reflector is partially transmissive at the frequency of the laser signal.

53. (Original) The method of claim 52, wherein the ~~dielectric material~~ waveguide is an optical fiber having an inlet end and an outlet end and ~~the step of~~ providing the resonator further comprises ~~the steps of~~:

forming a first Bragg reflector at the inlet end; and

forming a second Bragg reflector at the outlet end.

54. (Currently Amended) The method of claim 51, wherein ~~the step~~ sensing variations further comprises ~~the step of~~ providing a sensing surface communicating with the variable gap.

55. (Currently Amended) The method of claim 51, wherein the pulsed laser signal is produced by a mode-locked laser source and the resonator is external to the mode-locked

laser source, ~~the step of~~ propagating the pulsed laser signal further comprising coupling the at least a portion of the pulsed laser signal from the mode-locked laser source to the resonator.

56. (Original) The method of claim 51, wherein the resonator is formed of a lasing material forming a mode-locked laser source that produces the pulsed laser signals.

57. (Currently Amended) For use with a light source, an optical resonator having a waveguide formed of a first dielectric material and a cavity defining a variable gap formed of a second dielectric material different than the first dielectric material, wherein the variable gap ~~that~~ varies in response to changes in a measurable parameter, the optical resonator receiving light energy from the light source to alter a characteristic of the light energy in response to variations in the variable gap.

58. (Original) The optical resonator of claim 57, wherein the light energy is a continuous wave and the characteristic is frequency.

59. (Original) The optical resonator of claim 57, wherein the light energy is a pulsed laser energy and the characteristic is repetition rate.

60. (Original) The optical resonator of claim 57, wherein the light source is a LED source.

61. (Original) The optical resonator of claim 57, wherein the light source is a laser source.

62. (New) The apparatus of claim 35, wherein the coupler and high Q resonator are within a single substrate.

63. (New) The apparatus of claim 35, wherein the sensing surface is an outer surface of the high Q resonator.

64. (New) The apparatus of claim 35, wherein the sensing surface is spaced apart from the high Q resonator by a cavity.

65. (New) The apparatus of claim 40, wherein the cavity is internal to the waveguide.

66. (New) The apparatus of claim 40, wherein the cavity is external to the waveguide.